This Listing of Claims will replace all prior versions, and listings, of claims in the application:

Listing of Claims:

1. (original) A method of determining the impedance across a pressure junction in a section of an energized power distribution system using the energizing power, the method comprising:

measuring a first voltage produced by the energizing power at a first end of the section of the energized power system;

measuring a second voltage produced by the energizing power at a second end of the section of the energized power system;

measuring current through the section of the energized power system produced by the energizing power; and

determining the impedance as a difference between first voltage and the second voltage divided by the current.

2. (original) The method of Claim 1 wherein the measuring of the first voltage, the second voltage and the current is performed repeatedly multiple times, and wherein determining the impedance of the section of the power distribution system comprises summing a difference between the first and second voltages to generate a summed voltage difference and summing the current to generate a summed current for a selected number of measurements of the first voltage, the second voltage and the current, and dividing the summed voltage difference by the summed current to generate the impedance.

3. (original) The method of Claim 2 wherein the energized power distribution system is an ac power distribution system in which the first voltage, second voltage and the current are all ac and wherein the measuring of the first ac voltage, the second ac voltage and the ac current are performed substantially simultaneously.

4. (currently amended) The method of Claim 2 wherein determining impedance comprises summing a squared difference between the first voltage and the second voltage to generate a summed voltage difference squared and summing the current squared to generate a summed current squared for the selected number of measurements of the first voltage, the second voltage and the current and dividing the summed voltage difference squared by the summed current squared to generate a representation of the impedance.

5. (original) The method of Claim 4 wherein the steps of Claim 4 are repeated to generate successive values of the impedance and including limiting changes in the successive values of the impedance.

6. (original) The method of Claim 5 wherein limiting changes in successive values of impedance comprises changing the impedance to a preceding value of the impedance plus a value X when the impedance is more than the preceding value of the impedance, and changing the impedance to the preceding value of impedance minus the value X when the impedance is less than the preceding value of the impedance.

7. (original) The method of Claim 6 wherein the value X is generated by multiplying a selected gain by an initial value of the impedance.

8. (original) The method of Claim 4 wherein the energized power distribution system is an ac power distribution system in which the first voltage, the second voltage and the current are all ac and wherein determining the impedance comprises selecting measurements of the first ac voltage, the second ac voltage and measurements of the ac current used in generating the summed voltage difference squared and the summed current squared to eliminate any power factor in the energizing ac power.

9. (original) The method of Claim 8 wherein the selected number of the first ac voltage and the second ac voltage measurements used to generate the summed voltage difference squared and the selected number of ac current measurements used to generate the summed current squared are selected to begin at a zero crossing of the difference between the first and second ac voltage, and a closest zero crossing of the ac current.

10. (original) The method of Claim 1 wherein the current is measured by taking two spaced ac voltage measurements at two spaced apart points not separated by the pressure joint, but through which current through the pressure joint flows and between which a fixed impedance is known, and dividing a difference between the two spaced apart voltage measurements by the known fixed impedance.

11. (original) The method of Claim 10 wherein one of the first and second voltage measurements is used as one of the two spaced apart voltage measurements.

12. (original) The method of Claim 11 wherein measuring at least one of the first voltage, the second voltage and the current is performed using devices provided in the power distribution system selected from a group comprising: switches, circuit breakers, contactors, network protectors, overcurrent relays and monitors.

13. (original) The method of Claim 1 wherein the energized power distribution system is an ac power distribution system energized by ac power such that the first voltage, the second voltage and the current are all ac and wherein measuring the first ac voltage and the second ac voltage comprises calculating a transformer ratio from the first ac voltage and the second ac voltage when the first ac voltage and the second ac voltage differ

by a selected amount and applying the transformer ratio to one of the first ac voltage and the second ac voltage before determining the impedance.

14. (original) Apparatus for determining the impedance across a pressure junction in a section of an energized power distribution system using the energizing power, the apparatus comprising:

first voltage measuring means measuring a first voltage generated by the energizing power at a first end of the section of the energized power distribution system;

second voltage measuring means measuring a second voltage generated by the energizing power at a second end of the section of the energized power distribution system;

current measuring means measuring current through the section of the energized power distribution system generated by the energizing power; and

means determining the impedance by dividing a difference between the first voltage and the second ac voltage by the current.

15. (original) The apparatus of Claim 14 wherein the energizing power is ac power so that the first voltage, the second voltage and the current are all ac and the means measuring the first ac voltage, the means measuring the second ac voltage and the means measuring the ac current comprise synchronizing means measuring the first ac voltage, the second ac voltage and the ac current substantially simultaneously.

16. (original) The apparatus of Claim 14 wherein the means measuring the first voltage, the means measuring the second voltage and the means measuring the ac current, measure the first voltage, the second voltage and the current repeatedly, and wherein the means determining impedance comprise means repetitively calculating the impedance from the selected number of measurements of the first voltage, the second voltage, and the current.

17. (original) The apparatus of Claim 14 where the means determining the impedance comprises means repetitively calculating a voltage difference between corresponding measurements of the first and second voltages, means calculating a sum of the difference squared for the selected number of measurements of the first and second voltages, means generating a sum of current squared for the selected number of measurements of the current and means generating successive values of impedance as the sum of the voltage difference squared divided by the sum of the current squared.

18. (original) The apparatus of Claim 17 wherein the means determining impedance comprises means limiting changes in the successive values of impedance.

19. (original) The apparatus of Claim 18 wherein the means limiting changes in successive values of impedance comprise means changing the impedance calculated to the preceding value of impedance plus a value X when the impendence is more than the preceding value of the impedance, and means changing the impedance to the preceding value of impedance minus the value X when the impedance is less than the preceding value of impedance.

20. (original) The apparatus of Claim 18 wherein the means limiting changes in successive values of impedance further comprise means generating the value X as a selected gain times an initial value of the impedance.